CBCS SCHEME

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15AU72

Seventh Semester B.E. Degree Examination, Jan./Feb. 2023
Automotive Engine Components Design & Auxiliary Systems

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. What is a need of cylinder liner? Briefly explain two type liners. **(08 Marks)**

b. The bore of a cylinder of 4 stroke diesel engine is 150 mm. The maximum gas pressure inside the cylinder is limited to 3.5 MPa. The cylinder head is made of grey Cast Iron FG200 (Sut = 200 N/mm^2) and FOS is 5. Studs are used to fix cylinder head, made of steel (S_{yt} = 250 N/mm^2) and FOS is 5. Find (i) Thickness of cylinder head (ii) Number of studs (iii) Nominal diameter of studs K = 0.162. **(08 Marks)**

OR

2 a. With a neat sketch, explain any two methods of compensation of thermal expansion in piston. **(08 Marks)**

b. The following data is given for the piston of a 4 stroke diesel engine:
Bore = 250 mm ; maximum gas pressure = 4 MPa ;
Bearing pressure at small end of connecting rod = 15 MPa ;
Length of piston pin in bush of small end = 0.45D ;
Ratio of inner to outer diameter of piston pin = 0.6m ;
Mean diameter of piston boss = 1.4 Y; Outer diameter of piston pin.
Allowable bending stress for piston pin = 84 N/mm^2.
Calculate :
(i) Outer diameter of piston pin
(ii) Inner diameter of piston pin
(iii) Check the design for bending stresses. **(08 Marks)**

Module-2

3 a. Derive the equation for Buckling of connecting rod. **(08 Marks)**

b. Determine the dimensions of cross section of the connecting rod for a diesel engine. With the following data :
Cylinder bore = 10 mm ; Length of connecting rod = 350 mm ;
Maximum gas pressure = 4 MPa ; FOS = 6 ; σ_c = 330 N/mm^2 **(08 Marks)**

OR

4 a. With a neat sketch, explain vibration dampers. **(06 Marks)**

b. Design a centre Crankshaft at Top dead centre position. **(10 Marks)**

Module-3

5 a. What is a need of valve rotator? With neat sketch, explain free type valve rotators. **(08 Marks)**

b. With neat sketch, explain valve timing diagram of 4 stroke engine. **(08 Marks)**

OR

6 a. With neat sketch, explain working of 2 stroke SI engine with PV diagram. (08 Marks)

b. Explain following Scavenging parameters with suitable equations :

(i) Delivery ratio

(ii) Trapping Efficiency

(iii) Relative cylinder charge

(iv) Scavenging efficiency (08 Marks)

Module-4

7 a. With neat sketch, explain Baffle and absorber type muffler. (08 Marks)

b. With a neat sketch, explain spark arresters. (08 Marks)

OR

8 a. With neat sketch, explain thermo siphon cooling system. (08 Marks)

b. State the advantages and limitations of Air Cooling system. (08 Marks)

Module-5

9 a. With neat sketch, explain pressure feed (wet sump) type of lubrication system. (08 Marks)

b. Explain any 4 types of lubricants used in lubrication system. (08 Marks)

OR

10 a. With a neat sketch, explain turbo charger with an inter cooler for automotive engine. (10 Marks)

b. Explain supercharging. States the purpose of supercharging. (06 Marks)

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